UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,438	05/23/2002	Thorsteinn Halldorsson	420/50815	6621

23911 7590 11/08/2004

CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300

EXAMINER	
LAVARIAS, ARNEL C	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 11/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/031,438	HALLDORSSON, THORSTEINN	
	Examiner	Art Unit	
	Arnel C. Lavarias	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *23-27,29-35,40,43,44 and 47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *23-27,29-35,40,43,44 and 47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendments to the specification of the disclosure in the submission dated 9/20/04 are acknowledged and accepted. In view of these amendments, the objections to the specification in Section 7 of the Office Action dated 6/18/04 are respectfully withdrawn.

Response to Arguments

2. The Applicant's arguments filed 9/20/04 have been fully considered but they are not persuasive.

3. The Applicant argues that, with respect to newly amended Claims 23, 40, 43 and 44, Sato et al. in view of McGrew fails to teach or reasonably suggest a method of producing a video screen hologram as a holographic image of a real video screen, and video screen manufactured from the above method, as generally recited in Claims 23, 40, 43-44, and wherein the video screen hologram is one of a contact hologram and an image plane hologram, wherein during reconstruction of the holographic image of a real video screen, the projected video image appears in a hologram plane of the video screen hologram. The Examiner respectfully disagrees. With respect to the Sato reference, the Examiner specifically refers the Applicant to Figure 16 and col. 14, line 66-col. 16, line 33, which discloses the formation of the holographic screen panel using elementary holograms, and Figures 11-15 and col. 14, lines 6-62, which discloses the standard operation of the holographic screen panel, wherein incident laser light is diffracted by the various

elemental holograms comprising the screen. In this case, the real video screen is that of a diffusing plate (See 52 in Figure 16), of which portions are reproduced when the incident laser light strikes the holographic screen panel. Although Sato et al. does not specifically disclose the semiconductor-driven Nd:YAG laser (See col. 16, lines 3-8 of Sato et al.) as being a scanned pulsed source, one skilled in the art would recognize that typical Nd:YAG lasers are pulsed laser sources. Additionally, McGrew was cited to evidence a conventional method for recording holographic images onto a recording medium using such a scanned pulsed laser (See specifically Figure 5; col. 8, lines 19-36 of McGrew) to perform such a holographic recording. Further, with regard to the video screen hologram being a contact hologram, Gnädig 162 was cited to evidence a conventional method for producing a holographic screen via contact holographic techniques (See in particular Figures 1-2 of Gnädig 162), wherein a diffusion screen (i.e. the real video screen; See 11 in Figure 1 of Gnädig 162; 21 of Figure 2 for example) is placed in direct contact with the recording medium such that the reference beam and the scattered light (which also comes from the reference beam) from the diffusion screen interfere with each and is recorded in the holographic recording medium. It is noted that since the diffusion screen is in contact with the holographic recording medium, a maximum scattering intensity is interfered with the reference beam. This is as opposed to the case where the diffusion screen is not in contact with the recording medium, where much less scattered light would interfere with the reference beam, thus reducing the fringe visibility, and hence diffraction strength and efficiency of the recorded interference fringes. Further, since no separate object beam optical system (e.g. additionally lenses, mirrors, beam splitters) is required, the

complexity of the optical system is reduced. Finally, since the holographic screen is a contact hologram, the projected video image would inherently appear in the hologram plane of the holographic screen (See col. 4, line 60-col. 5, line 5 of Gnädig 162).

4. Claims 23-27, 29-35, 40, 43-44, and 47 are rejected as follows.

Claim Objections

5. Claim 29 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 29 recites the limitation of the method producing a contact hologram or a video screen hologram. However, Claim 23, from which Claim 29 is dependent on, already recites that the video screen hologram (i.e. the hologram being produced) is one of a contact hologram and an image plane hologram.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (U.S. Patent No. 5926294), of record, in view of McGrew (U.S. Patent No. 5138471), of record.

Sato et al. discloses a method of producing a video screen hologram for forming a projected video image thereon, the video screen hologram being formed as a holographic image of a real video screen (See for example Figure 16; col. 15, line 7-col. 16, line 33), the hologram being either a transmission or reflection hologram (See col. 5, lines 49-55; col. 6, lines 21-43), by illuminating the real video screen (See 51, 52 in Figure 16) with narrowband light (See 31 in Figure 16; col. 16, lines 3-8), such as by a semiconductor-driven Nd:YAG laser (See col. 16, lines 3-8), to generate a hologram of the real video screen (See 43 in Figure 16), the method comprising making a plurality of individual recordings by illuminating an area of the real video screen, the partial areas of the video screen having a size that corresponds to image pixels (See for example Figure 11; Abstract); and forming video screen hologram of a portion of the video screen by a composition of the individual recordings (See col. 15, line 7-col. 16, line 33), the illumination of the video screen being performed by scanning the substrate and holographic recording medium (See col. 15, line 40- col. 16, line 2), and optical characteristics of the real video screen being stored in the video screen hologram (It is noted that the optical diffusion properties at each spot illuminated by the incident laser beam is recorded in the holographic recording medium). Further, Sato et al. discloses the video screen hologram manufactured from the above method (See 42, 43 in Figure 16; Abstract; Figure 11), wherein the video screen hologram comprises a plurality of

individual recordings, in each of which a partial area of the real video screen is imaged as a hologram, an entire image of the whole video screen resulting from assembled or superimposed individual recordings (See col. 15, line 7-col. 16, line 33), the illumination of the video screen being performed by scanning the substrate and holographic recording medium (See col. 15, line 40- col. 16, line 2). Sato et al. lacks sequentially illuminating partial areas of the real video screen to form a video screen hologram of the entire video screen or the illumination of the video screen being performed using a scanning pulsed laser beam. However, McGrew teaches a method for recording holographic images onto a holographic recording medium by recording an array of pixels (See for example Abstract), wherein a scanned pulse laser is utilized for illumination (See in particular Figure 5; col. 8, lines 19-36). McGrew additionally teaches that the diffusion screen of the apparatus (See for example 120 in Figure 1; 905 in Figure 8) may be illuminated in plural partial areas such as to form a hologram of the entire diffusion screen. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to sequentially illuminate partial areas of the real video screen to form a video screen hologram of the entire video screen and to have the illumination of the video screen be performed using a scanning pulsed laser beam, as taught by McGrew, in the method of producing a video screen hologram and the video screen hologram manufactured from the method of Sato et al., for the purpose of 1) providing point-by-point image recording for generation of larger, composite holograms, and 2) providing high-speed illumination and recording of the holograms, and reduced manufacturing

times, since high speed laser beam scanning and high pulse rates are more easily attained than high speed raster scanning movement of the holographic substrate and medium.

8. Claims 23, 25-26, 29-30, 40, 43, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of McGrew as applied to Claim 44 above, and further in view of Gnädig et al. (DE19700162A1, or Gnädig 162), of record.

Sato et al. in view of McGrew discloses the invention as set forth above in Claim 44, except for the video screen hologram being one of a contact hologram and an image plane hologram, whereby during reconstruction of the holographic image of a real video screen, the projected video image appears in a hologram plane of the video screen hologram. However, Gnädig 162 teaches a method for generating a holographic screen for laser front projection (See for example Abstract; Figures 1-2), wherein a contact hologram is formed by contact of the diffusion screen (See 11 in Figure 1; 21 in Figure 2) with the holographic medium (See 12 in Figure 1; 22 in Figure 2). It is noted that the image plane for contact holograms is located at the plane of the holographic recording material during both recording and playback (See col. 4, line 60-col. 5, line 5). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the video screen hologram be one of a contact hologram and an image plane hologram, whereby during reconstruction of the holographic image of a real video screen, the projected video image appears in a hologram plane of the video screen hologram, as taught by Gnädig 162, in the method of producing a video screen hologram and the video screen hologram manufactured from the method of Sato et al. in view of McGrew, for the purpose of maximizing the amount of scattered light

captured/recorded by the holographic medium, and reducing the complexity of the recording apparatus, since a separate reference beam optical system (i.e. additional beam splitters, beam steering mirrors, lenses) is not required (the reference beam is generated by the scattered light from diffusion screen itself).

9. Claims 24 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of McGrew, and further in view of Gnädig et al.

Sato et al. in view of McGrew, and further in view of Gnädig et al. discloses the invention as set forth above in Claims 23 and 44, except for the pulse duration being dimensioned such that the movement of the laser beam over the video screen has substantially no effect on interference of the light waves in the hologram, the movement of the laser beam during a pulse being smaller than 1/10 of the wavelength. However, it is well known in the art of interferometry and holography that one must control the laser pulse width, as well as the movement speed of the workpiece upon which the interference pattern is incident upon, to avoid 'smearing' the interference fringes, and hence reducing the fringe visibility of the interference pattern. Optimal fringe visibility may be obtained by a combination of reducing the laser pulse width and reducing the movement speed of the workpiece. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the pulse duration be dimensioned such that the movement of the laser beam over the video screen has substantially no effect on interference of the light waves in the hologram, the movement of the laser beam during a pulse being smaller than, for example, 1/10 of the wavelength, for the purpose of

optimizing the fringe visibility of the interference fringes, thus leading to the production of a bright reconstructed image.

10. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of McGrew, and further in view of Gnädig et al. as applied to Claims 23 and 44 above, and further in view of Sukhman (U.S Patent No. 4338578), of record.

Sato et al. in view of McGrew, and further in view of Gnädig et al. discloses the invention as set forth above in Claims 23 and 44, except for a frequency conversion taking place in one or several of the wavelength ranges red, green, blue. However, Sukhman teaches the use of a multicolor pulsed coherent light source (See for example Figure 1) for use in full color holography, wherein the frequency conversion of red and infrared wavelengths is utilized to generate green and blue wavelengths (See col. 2, line 33- col. 3, line 34). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have a frequency conversion take place in one or several of the wavelength ranges red, green, blue, as taught by Sukhman, in the method of producing a video screen hologram and the video screen hologram manufactured from the method of Sato et al. in view of McGrew, and further in view of Gnädig et al., for the purpose providing the three primary color wavelengths (i.e. red, green, and blue) for holographic recording, while maintaining the required coherence among the three wavelengths.

11. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of McGrew, and further in view of Gnädig et al.

Sato et al. in view of McGrew, and further in view of Gnädig et al. discloses the invention as set forth above in Claims 23 and 44. Sato et al. in view of McGrew, and further in view of Gnädig et al. does not specifically disclose laser beams of a coherence length being generated which are greater than a difference between light paths of the object beam and the reference beam. However, as is known in the art of interferometry and holography, satisfactory holograms are obtained when the maximum optical path difference between the object and reference beams in the recording system are much less than the coherence length of the light from the laser. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the source of Sato et al. in view of McGrew, and further in view of Gnädig et al. generate laser beams of a coherence length which are greater than a difference between light paths of the object beam and the reference beam, for the purpose of producing a satisfactory, usable hologram with reasonable fringe visibility.

12. Claims 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of McGrew, and further in view of Gnädig et al. as applied to Claims 23 and 44 above, and further in view of Arns et al. (U.S. Patent No. 4456328), of record.

With regard to Claim 33, Sato et al. in view of McGrew, and further in view of Gnädig et al. discloses the invention as set forth above in Claims 23 and 44, except for a repeated scanning of the video screen surface taking place by means of a respectively phase-shifted laser beam. However, Arns et al. teaches a hologram-forming system (See for example Figure 5) for producing diffusion type holograms, wherein a phase-shifted laser beam (See for example col. 2, lines 20-51) is used to record the holograms.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the a repeated scanning of the video screen surface taking place by means of a respectively phase-shifted laser beam, as taught by Arns et al., in the method of producing a video screen hologram and the video screen hologram manufactured from the method of Sato et al. in view of McGrew, and further in view of Gnädig et al., for the purpose of reducing or eliminating spurious hologram recordings caused by unwanted reflections from the surfaces of the optical elements in the system.

With regard to Claim 34, Sato et al. in view of McGrew, and further in view of Gnädig et al. discloses the invention as set forth above in Claims 23 and 44, except for the distribution of the lumination in the hologram being measured to correct lumination in a subsequent lumination cycle. However, Arns et al. teaches a hologram-forming system (See for example Figures 5 and 7) for producing diffusion type holograms, wherein a phase-shifted laser beam (See for example col. 2, lines 20-51) is used to record the holograms. Further, photodetectors (See for example 204, 206) are utilized within the optical system as optical beam pick-up for the reference and object beams so that a comparison may be made with respect to each beam's intensity for feedback during subsequent hologram writing cycles (See col. 7, line 36-col. 8, line 42). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the distribution of the lumination in the hologram being measured to correct lumination in a subsequent lumination cycle, as taught by Arns et al., in the method of producing a video screen hologram and the video screen hologram manufactured from the method of Sato et al. in view of McGrew, and further in view of

Gnädig et al., for the purpose of providing optical feedback and reduce the optical system's dependence on the source's absolute power output.

13. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. in view of McGrew, and further in view of Gnädig et al. as applied to Claims 23 and 44 above, and further in view of Hariharan (P. Hariharan, 'Optical holography: Principles, techniques, and applications', Cambridge University Press, Cambridge, 1996, pp. 69-84, 181-184.), of record.

Sato et al. in view of McGrew, and further in view of Gnädig et al. discloses the invention as set forth above in Claims 23 and 44, except for the plural luminations being carried out with mutually perpendicularly polarized energy beams to produce two mutually independent screen images in the hologram. However, Hariharan teaches the use of standard polarization recording techniques for recording multiple holograms of varying polarization characteristics onto a holographic recording medium (See pp. 181-184). For example, Hariharan teaches a particular arrangement (See Figure 11.1 on Page 182) wherein orthogonally polarized reference beams are used to record two holograms, each having characteristics of one of the two orthogonal polarizations (See Section 11.1.1 on Page 181). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the plural luminations be carried out with mutually perpendicularly polarized energy beams to produce two mutually independent screen images in the hologram, as taught by Hariharan, in the method of producing a video screen hologram and the video screen hologram manufactured from the method of Sato et al. in view of McGrew, and further in view of Gnädig et al., for the purpose of

precisely recording and recreating the polarization state of the object beam, which is generally lost in normal holographic techniques.

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Arnel C. Lavarias
11/1/04

THONG NGUYEN
PRIMARY EXAMINER
GROUP 2800